

MATERIAL SAFETY DATA SHEET

SRM Supplier: National Institute of Standards and Technology
Standard Reference Materials Program
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SRM Number: 3148a
MSDS Number: 3148a
SRM Name: Scandium Standard Solution
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SECTION I. MATERIAL IDENTIFICATION

Material Name: Scandium Standard Solution

Description: SRM 3148a is a single element solution prepared gravimetrically to contain a nominal 10 mg/mL (or 10 mg/g) of scandium with a nitric acid volume fraction of 10 %.

Other Designations: Scandium in Nitric Acid (aqua fortis; hydrogen nitrate; azotic acid; engravers acid). *Scandium Nitrate (nitric acid, scandium (3+) salt; scandium trinitrate) in standard solution.

Name	Chemical Formula	CAS Registration Number
Nitric Acid	HNO ₃	7697-37-2
Scandium Nitrate	Sc(NO ₃) ₃	13465-60-6
Scandium	Sc	7440-20-2

DOT Classification: Nitric Acid Solution, UN2031

Manufacturer/Supplier: Available from a number of suppliers

*The addition of scandium to nitric acid, along with other intermediate chemical reactions, forms scandium nitrate which will precipitate upon evaporation or drying of the solution.

SECTION II. HAZARDOUS INGREDIENTS

Hazardous Components	Nominal Concentration (%)	Exposure Limits and Toxicity Data
Nitric Acid	10	ACGIH TLV-TWA: 2 mg/kg or 5 mg/m ³
		OSHA TLV-TWA: 2 mg/m ³ or 5 mg/m ³
		Human, Oral: LD ₅₀ : 430 mg/kg
Scandium Nitrate	5.14	No TLV-TWA established*
Scandium	1	No TLV-TWA established*

*The suggested ACGIH TLV-TWA for particulates not otherwise regulated is 10 mg/m³ for total dust.

SECTION III. PHYSICAL/CHEMICAL CHARACTERISTICS

Nitric Acid	Scandium Nitrate	Scandium
Appearance and Odor: A white to slightly yellow liquid that darkens to a brownish color upon aging and exposure to light; irritating odor	Appearance and Odor: Prismatic deliquescent crystals; crystallizes as the tetrahydrate	Apperance and Odor: A grey metal; reported to be dimorphic
Relative Molecular Mass: 63.02	Relative Molecular Mass: 230.97	Relative Atomic Mass: 44.95
Density: 1.0543 (10 % nitric acid)	Density: Not available	Density: 2.989
Solubility in Water: Soluble	Solubility in Water: Soluble	Solubility in Water: Decomposes in water
Solvent Solubility: Decomposes in alcohol	Solvent Solubility: Soluble in alcohol	Solvent Solubility: Not available

Note: The physical and chemical data provided are for the pure components. Physical and chemical data for this scandium/nitric acid solution do not exist. The actual behavior of the solution may differ from the individual components.

SECTION IV. FIRE AND EXPLOSION HAZARD DATA

Flash Point: N/A

Method Used: N/A

Autoignition Temperature: N/A

Flammability Limits in Air (Volume %):	UPPER:	N/A
	LOWER:	N/A

Unusual Fire and Explosion Hazards: Although nitric acid does not burn, it is a powerful oxidizing agent that can react with combustible materials to cause fires.

Extinguishing Media: Use extinguishing media that is appropriate to the surrounding fire. Use a water spray to dilute nitric acid and to absorb liberated oxides of nitrogen.

Special Fire Procedures: Fire fighters should wear a self-contained breathing apparatus (SCBA) with a full face piece in the pressure demand or positive mode and other protective clothing.

SECTION V. REACTIVITY DATA

Stability: X **Stable** **Unstable**

Conditions to Avoid: Avoid contact with incompatible materials.

Incompatibility (Materials to Avoid): Keep nitric acid away from organic materials, plastics, rubber, and some forms of coatings. Nitric acid is incompatible with chlorine and metal ferrocyanide. Avoid metals, metal oxides, hydroxides, amines, carbonates, and other alkaline materials, cyanides, sulfides, sulfates, and formaldehyde.

See Section IV: *Unusual Fire and Explosion Hazards*.

Hazardous Decomposition or Byproducts: Hazardous decomposition of nitric acid and/or scandium nitrate can produce various nitrogen oxides, including nitric oxide (NO), nitrogen dioxide (NO₂), nitrous oxide (N₂O), as well as nitric acid mist or vapor.

Hazardous Polymerization: _____ Will Occur X Will Not Occur

SECTION VI. HEALTH HAZARD DATA

Route of Entry: X Inhalation X Skin X Ingestion

Health Hazards (Acute and Chronic): Nitric Acid: Nitric acid may be fatal if inhaled, swallowed, or absorbed through skin. This material causes burns and is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes, and skin. Inhalation may be fatal as a result of spasm, inflammation and edema of the larynx and bronchi, chemical pneumonitis, and pulmonary edema. Symptoms of exposure may include burning sensation, coughing, wheezing, laryngitis, shortness of breath, headache, nausea, and vomiting.

Scandium and Scandium Nitrate: Scandium and its compounds, like other rare earth elements, have low expected toxicity evaluations. Skin exposure can lead to irritation. Rare earth compounds may inhibit blood clotting.

Medical Conditions Generally Aggravated by Exposure: N/A

Listed as a Carcinogen/Potential Carcinogen:

	Yes	No
In the National Toxicology Program (NTP) Report on Carcinogens	<u> </u>	<u> X </u>
In the International Agency for Research on Cancer (IARC) Monographs	<u> </u>	<u> X </u>
By the Occupational Safety and Health Administration (OSHA)	<u> </u>	<u> X </u>

EMERGENCY AND FIRST AID PROCEDURES:

Skin Contact: Remove contaminated shoes and clothing. Rinse affected area with large amounts of water followed by washing the area with soap and water. Watch for chemical irritations and treat them accordingly. Obtain medical assistance if necessary.

Eye Contact: Immediately flush eyes, including under the eyelids, with copious amounts of water for at least 15 minutes. Obtain medical assistance if necessary.

Inhalation: If inhaled, move the victim to fresh air. If breathing is difficult, give oxygen; if the victim is not breathing, give artificial respiration. Obtain medical assistance if necessary.

Ingestion: If ingestion occurs, wash out mouth with water. **DO NOT** induce vomiting. Obtain medical assistance immediately.

Note (Nitric Acid): Wash affected skin areas with 5 % solution of sodium bicarbonate (NaHCO_3). If ingested, the risk versus the benefit of the passage of a naso-gastric tube is debatable. Activated charcoal is of no value. **DO NOT** give the exposed person bicarbonate to neutralize the material.

TARGET ORGAN(S) OF ATTACK: **Nitric Acid:** The skin, teeth, eyes, and upper respiratory tract
Scandium and Scandium Nitrate: The skin and blood

SECTION VII. PRECAUTIONS FOR SAFE HANDLING AND USE

Steps to be taken in Case Material is Released or Spilled: Notify safety personnel of spills. Surfaces contaminated with spills should be covered with soda ash or sodium bicarbonate to neutralize the acid. Place the neutralized material into containers suitable for eventual disposal, reclamation, or destruction.

Waste Disposal: Follow all federal, state, and local laws governing disposal.

Handling and Storage: Provide general and local explosion proof ventilation systems to maintain airborne concentrations below the TLV. Provide approved respiratory apparatus for nonroutine or emergency use. Use an approved filter and vapor respirator when the vapor or mist concentrations are high. Wear gloves and chemical safety glasses where contact with the liquid or high vapor concentrations may occur. An eye wash station and washing facilities should be readily available near handling and use areas. Wash exposed skin areas several times a day with soap and warm water.

Note: Contact lenses pose a special problem; soft lenses may absorb irritants and all lenses concentrate them. **DO NOT** wear contact lenses in the laboratory.

Store this material in its original container(s) at room temperature. It must be tightly sealed or recapped when not in use to protect from moisture.

SECTION VIII. SOURCE DATA/OTHER COMMENTS

Sources: MDL Information Systems, Inc., MSDS *Scandium*, March 12, 1998.
MDL Information Systems, Inc., MSDS *Scandium Trinitrate*, March 12, 1998.
MDL Information Systems, Inc., MSDS *Nitric Acid*, March 12, 1998.
Merck Index, 11th Ed., 1989.
The Sigma Aldrich Library of Chemical Safety Data, Ed. II, 1988.

Disclaimer: Physical and chemical data contained in this MSDS are provided only for use in assessing the hazardous nature of the material. The MSDS was prepared carefully, using current references; however, NIST does not certify the data on the MSDS. The certified values for this material are given in the NIST Certificate of Analysis.